



Status of IEEE P1516 Series HLA Standards



Presented to:

**DMSO Industry Days
22 May 2000**

Prepared by:

Mike Lightner

The AEgis Technologies Group, Inc

Orlando, FL

mlightner@AEgisTG.com



Outline

- Background
- A Quick Process Review
- The HLA Working Group
- The BRCs
- A Review of Improvements Made
- Summary



Background



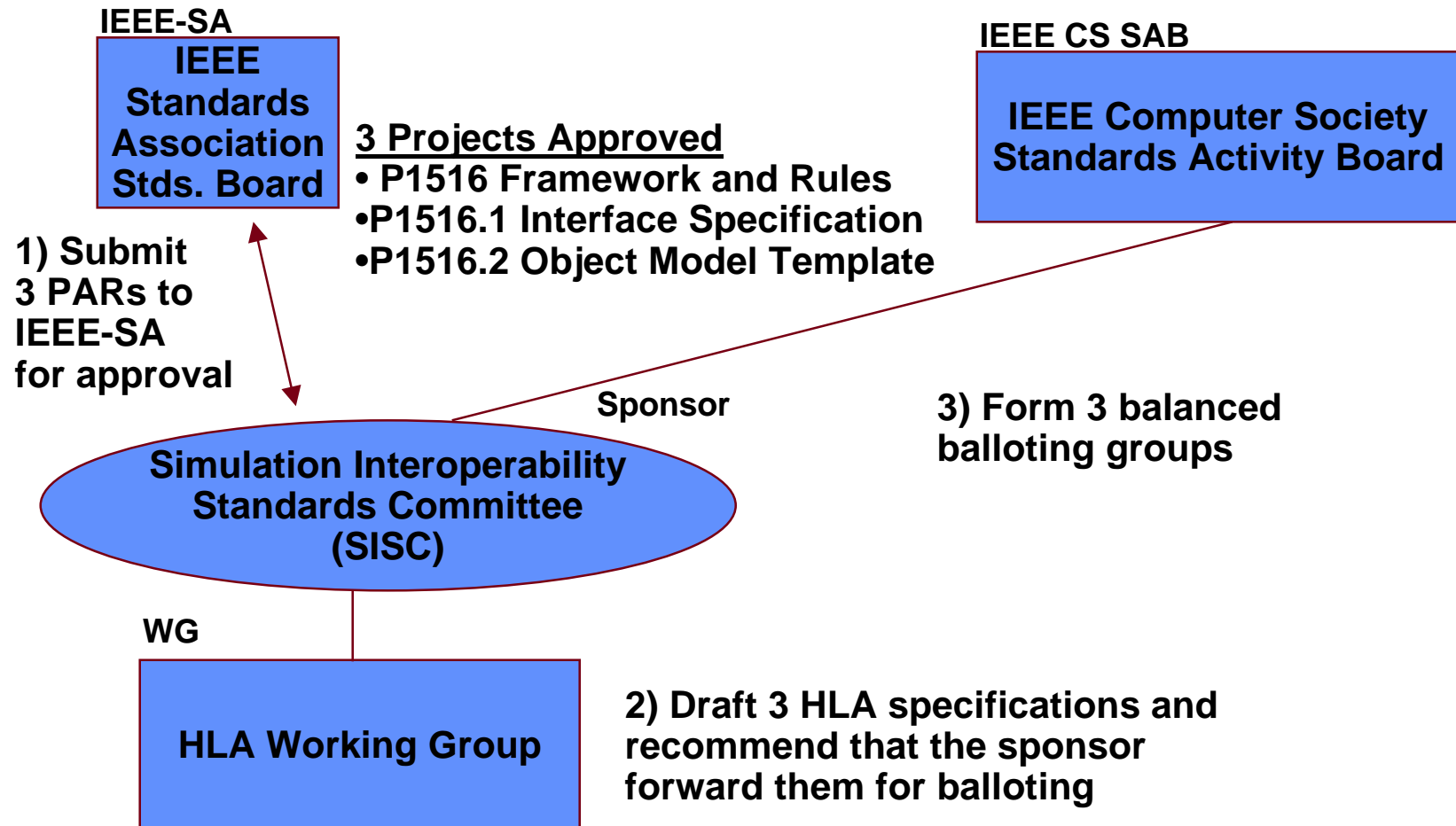
IDEA: Let's work with the IEEE to make the DoD HLA specifications formal standards.

So we set off. The first thing we had to do was understand the IEEE Standards Development Process.



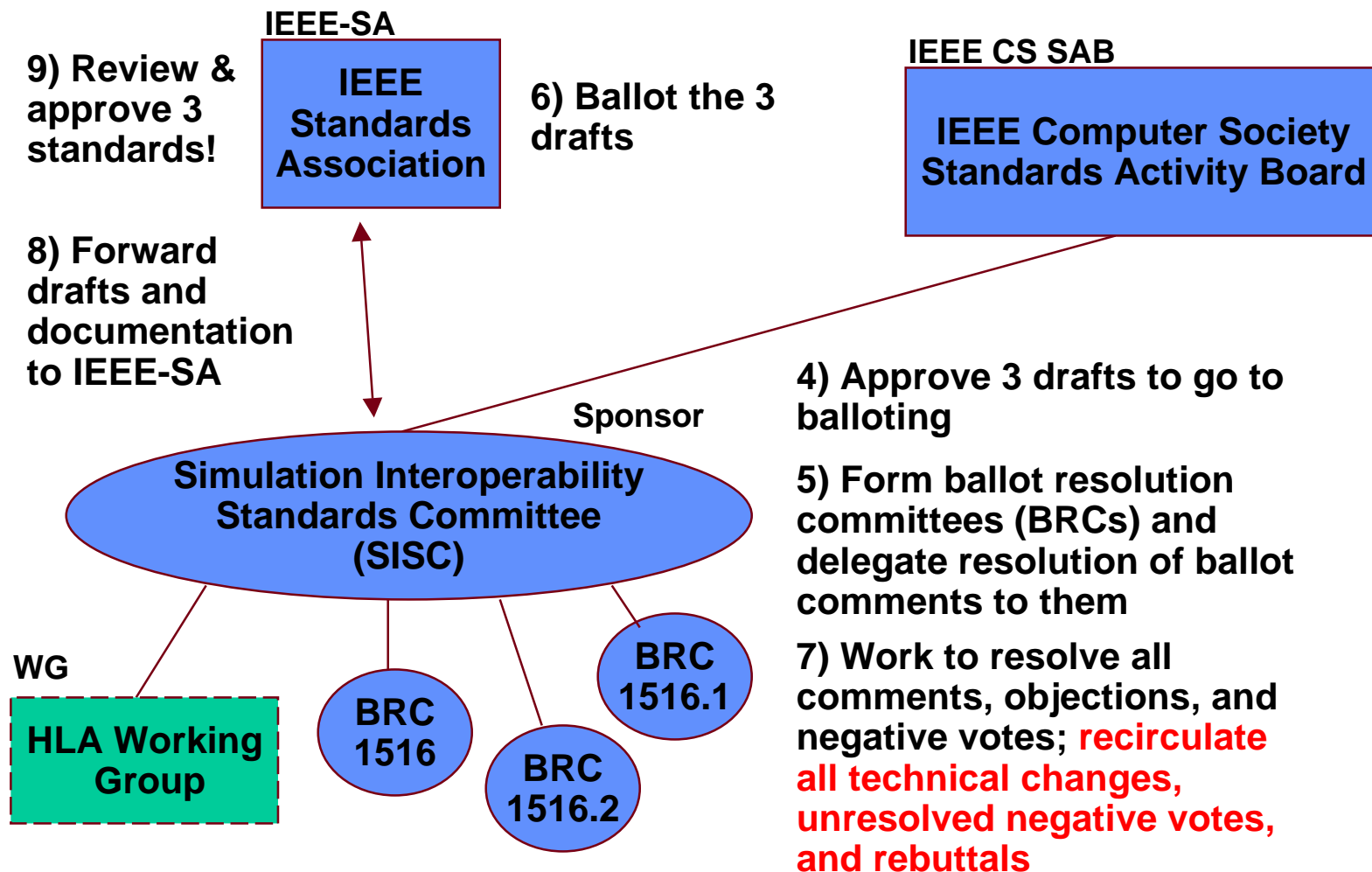


A Review of the IEEE Process



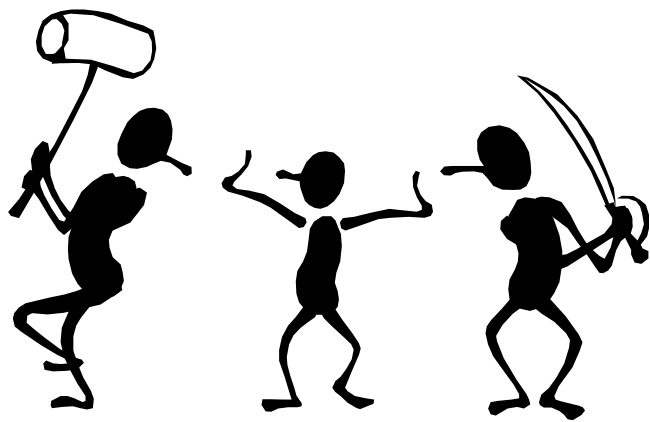


A Review of the IEEE Process





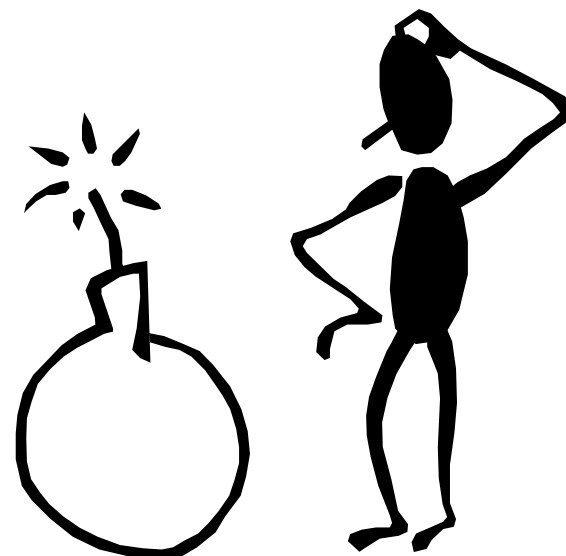
HLA Working Group



Susan

The Working Group formed, chose our tools and started our work.

The first thing the Working Group did was to ponder the task that was handed us.





Summary of the WG Activity

HLA Working Group

3 full comment and review cycles

Drafts posted online; comments were accepted from anyone

Responded to all 706 comments received

- 0 **Mtg 1: March 1998, Orlando, FL**
- 0 **Draft 1: April 20, 1998, 213 comments**
- 0 **F&W: 37, I/F Spec: 98, OMT: 78**

- 0 **Mtg 2: June 1998, Austin, TX**
- 0 **Draft 2: July 27, 1998, 255 comments**
- 0 **F&W: 18, I/F Spec: 165, OMT: 72**

- 0 **Mtg 3: Sept. 1998 Alexandria, VA**
- 0 **Draft 3: Nov. 16, 1998, 238 comments**
- 0 **F&W: 13, I/F Spec: 138, OMT: 87**

- 0 **Mtg 4: Jan. 1999, San Diego, CA**
 - **Approval to forward three final drafts to SISC for balloting**

- 0 **Final Draft: March 9, 1999**



Ballot Resolution Committees



With the SISC vote to forward the drafts for balloting we toasted ourselves...

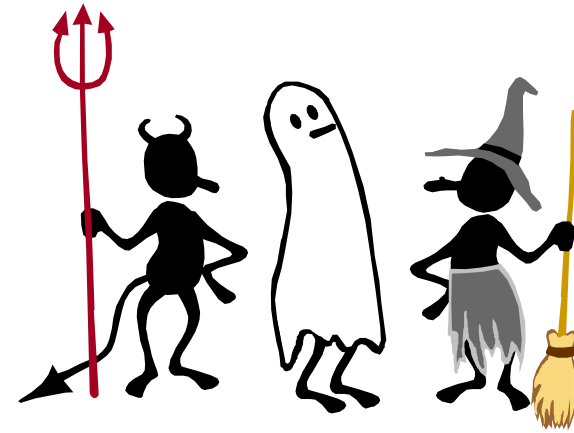
... and handed our work off to the IEEE BRCs.





Balloting the Drafts

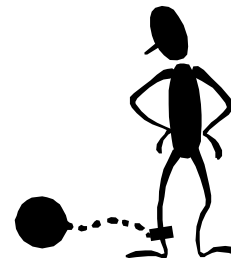
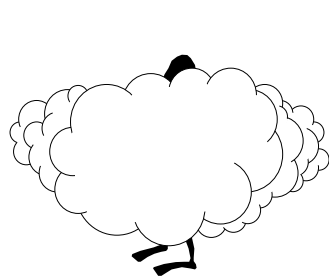
Thus, the BRCs formed taking on a slightly different appearance and employing a few new tools.



Ballot Groups were also formed.



8/3/00





IEEE P1516/D5

HLA Framework and Rules

1st Ballot Results

Ballot group size	87		
Affirmative votes	56		
Negative votes	22		
Abstention votes	0		
Votes	78	90%	Returned
		0%	Abstention
Affirmative votes	56		
Negative votes	22		
Votes	78	72%	Affirmative



IEEE P1516.1/D5

HLA Interface Specification

1st Ballot Results

Ballot group size	80		
Affirmative votes	34		
Negative votes	35		
Abstention votes	5		
Votes	74	93%	Returned
		6%	Abstention
Affirmative votes	34		
Negative votes	35		
Votes	69	49%	Affirmative



IEEE P1516.2/D5 HLA Object Model Template

1st Ballot Results

Ballot Group Size: 85
Affirmative Votes: 40
Negative Votes: 36
Abstention Votes: 1

Votes 77 90% Returned
 1% Abstention

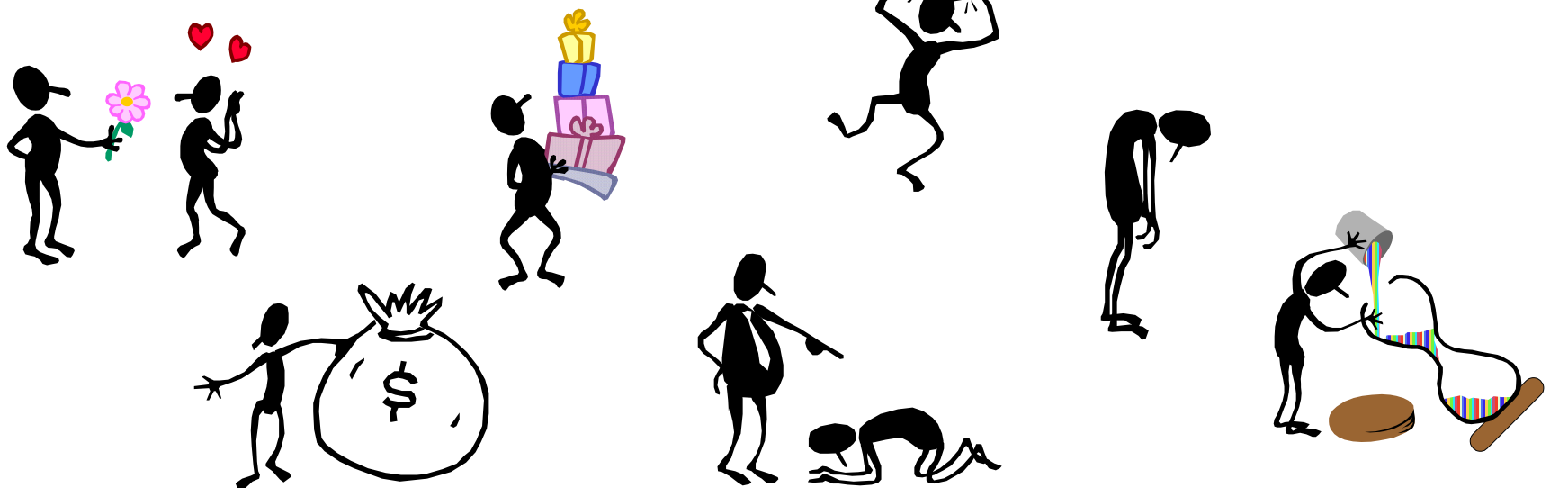
Affirmative Votes: 40
Negative Votes: 36

Votes 76 53% Affirmative



The Goal: Consensus

The BRCs worked with the balloters to do all we could to understand their concerns and reach consensus.



8/3/00

13



IEEE P1516/D5 (Rules)

Ballot Resolutions

Count of Ballot Item Type	Ballot Item Type			
O	Content	Editorial	Objection	Grand Total
Accept	25	62	23	110
Accept w/BRC changes	46	15	28	89
Reject	7	0	16	23
Balloter was non-responsive in discussion of reject	1	0	0	1
Withdrawn by balloter	0	0	1	1
Grand Total	79	77	68	224



P1516/D5 Editorial Changes

- Formatting Corrections/Improvements
- Typographical Corrections
- Wording Clarifications
- Changes to Insure Consistency
- Addition of IEEE Prescribed Up Front Matter like Abstract, Copyright, Disclaimers, Participants etc.
- OO Concepts vs HLA OMT discussion (which was already in the OMT specification) modified and included in the other two specifications.



P1516/D5 Definitions/Acronyms

- Master Definitions file created and used for all three specifications.
 - Addition/Modification of Definitions used in any of the three specifications.
 - Addition/Modification of Acronyms used in any of the three specifications.
- Numerous comments on definitions.
- Majority of the changes in Rules document were in the definitions. As a result they are tighter, more robust and consistent.



P1516/D5 Technical Changes

- Creation of a Rationale Annex and the moving of such text from the main document to this annex.
- Addition of a more descriptive narrative in the introduction to better introduce the document.
- Addition//Modification of technical definitions.
- Changes of descriptive text and/or examples to insure correctness and consistency.
- Inclusion new descriptive text to insure proper interpretation of the Rules and accompanying rationale.



P1516/D5 Technical Changes

- Some structural changes for the better.
- Rules themselves have remained consistent.
- A couple comments suggesting removing all references to MOM. While we did clarify wording, the references to MOM were retained.
- Cleaning up references to "RTI". Changing to IFSpec as appropriate or removing reference since this is not an RTI specification.
- Overall, some very good changes to the text which tightened up and improved the wording and removed some inconsistencies.



IEEE P1516.1 (IFSspec)

Ballot Resolutions

	Ballot Item Type			
BRC Response	Content	Editorial	Objection	Grand Total
Accept	69	76	95	240
Accept w/BRC changes	36	18	70	124
Balloter was non-responsive in providing additional information	0	0	9	9
Reject	3	5	8	16
Balloter was non-responsive in discussion of reject	2	0	5	7
Withdrawn by balloter	21	3	28	52
Grand Total	131	102	215	448



Federation Management

- New services for save/restore stati
 - *Query/Response Save/Restore* status
 - help deal with “zombie” federates
- Added synch point statecharts
- Added additional options to *Resign*
- Added *Sync Point Registration* failure reason
- Added *Restore* failure reason
- Clarified semantics of *Timed Save* in mixed time federations



Declaration Management

- Changed *Publication/Subscription* Semantics from replacement to additive
 - benefits
 - unsubscribe provides replace capability
 - federate can publish/subscribe at various points in software
 - consistent with DDM region semantics
- Also for DDM *Subscription with Regions*



Object Management

- Handles are uniform and unique in a federation execution
- Federation execution-wide unique object instance names, either federation or RTI provided
- Transportation and Order types of *Remove Object Instance* \neq messages based on types of corresponding HLApriilegeToDeleteObject instance attribute



Ownership Management

- Made release protocol more symmetrical with acquisition protocol
 - *Attribute Ownership Release Response-> Attribute Ownership Divestiture If Wanted*
- *Attribute Ownership Divestiture Notification* † changed to two step protocol
 - *Request Divestiture Confirmation †*
 - *Confirm Divestiture*
- Added user-supplied tags to some services to support “last valid value” and “internal state” xfer
- Renamed services for added consistency



Time Management

- Time argument added to RO messages
- Clarified time semantics for:
 - *Flush Queue Request*
 - event retraction
 - time advancement
 - mixed time federations and dynamic regulating/constrained enables/disables
- Federation can specify related time abstract data types
- Terminology cleaned up and made consistent



DDM

- Removed space and extent concepts
- DDM entities now ADTs (Regions & Ranges)
- Bounds are now integer based
- OMT defined upper bound for each dimension



Support Services

- Advisory services
 - RTI and service actions better explained
- New/different services to support new DDM
 - *Get Dimension Upper Bound, Get Dimension Handle Set, Get/Set Range Bounds*
- Support for MOM & DDM
 - *Normalize Federate Handle, Normalize Service Group*
- New services
 - *Initialize & Finalize RTI services*
 - *Evoke (Multiple) Callback(s)*
 - *Enable/Disable Callbacks*



MOM - 1

- MOM in OMT-speak
 - use new default OMT data types and encodings
- Additions
 - more federate info
 - support sync “deadlock” handling
- Service reporting
 - HLAmanger.HLAfederate.HLAreport.
HLAreportServiceInvocation interaction



MOM - 2

- Enhanced MOM error handling - new interaction *HLAfederate.HLAreport.HLAMOMAlert*, reports when
 - a MOM interaction without all necessary parameters is sent
 - an interaction that imitates a federate's invocation of an RTI service is sent & all the service's pre-conditions are not met.
- Some MOM interactions allowed during save/restore
 - helps federation managers assist when federates fail during save or restore



MOM - 3

- DDM & MOM
 - all attributes of instances of class
HLAmanager.HLAfederate: Federate dimension
 - interactions of class HLAmanager.HLAfederate.HLAreport.
HLAreportServiceInvocation: Federate and ServiceGroup
dimensions
 - interactions of class HLAmanager.HLAfederate.HLAreport:
Federate dimension



Programming Language Mappings Clause

- New clause to map abstract view of the services in the body of spec (clauses 4-10) with APIs (Annexes A-C)
 - designators -> handles/names in the APIs
 - services -> methods in the APIs
 - abstract datatypes -> classes or datatypes in the APIs



APIs - General

- Cleaned up APIs - rearrange and restructure files
- Added example time ADTs (based on integer 64)
- API/body exception/signature consistency
 - service changes as dictated by changes in body
- Removed IDL API
- Added wide (2 byte character) strings for Unicode support



Misc

- Legal transportation types defined in OMT table
- Cleaned up terminology and text - pre/post conditions, exceptions, APIs agreement
- Editorial comments addressed
- Added Rationale annex
- Added Reference State Charts section to all services



IEEE P1516.2 (OMT)

Ballot Resolutions

	Ballot Item Type			
BRC Response	Content	Editorial	Objection	Total
Accept	56	70	48	174
Accept w/BRC changes	25	5	14	44
Reject	18	16	2	36
Withdrawn	0	0	12	12
Grand Total	99	91	74	264



P1516/D5 (OMT) Modifications

- New Tables:
 - Datatype Tables
 - Time Representation Table
 - User-Supplied Tag Table
 - Synchronization Table
 - Transportation Type Table
 - Switches Table
 - Notes Table
- New Annexes:
 - OMT DIF FOM Example



P1516/D5 (OMT) Modifications

- Modified Tables:
 - Object Model Identification Table
 - Object Class Structure Table
 - Interaction Class Structure table
 - Attribute Table
 - Parameter Table
 - Routing Space (Dimension) Table
- Modified Annexes:
 - Common Normalization functions (Annex B)
 - OMT DIF (Annex D)
 - OMT DIF SOM Example (Annex E)



P1516/D5 (OMT) Modifications

- Replaced Tables:
 - Enumerated Datatype Table
 - Complex Datatype Table



OMT DIF Changes

- OMT V1.3 DIF specification uses BNF
- OMT D5 DIF specification uses XML (eXtensible Markup Language)
- Technical feasibility and business case well established



OMT DIF Changes

- Why move to XML?
 - Leverage the collective ideas of industry beyond our community
 - Growing broad based population of XML users
 - Lower costs of maintenance
 - Use an available standard instead of maintaining our own
 - Access to a trained work force
 - Industry is using XML already, the HLA DIFs will be just another XML application
 - Access to free and commercial supporting software
 - Widespread use of XML is leading to XML support in existing products and availability of freeware support tools



Summary of Editorial Changes HLA 1.3 to IEEE P1516 Series

- Formatting/Consistency Corrections/Improvements
- Typographical Corrections/Wording Clarifications
- All Definitions/Acronyms used in all of the P1516 Series Specifications.
- Addition of IEEE Prescribed Up Front Matter like Abstract, Copyright, Disclaimers, Participants etc.
- OO Concepts vs HLA OMT discussion (which was already in the OMT specification) modified and included in the other two specifications.



Summary of Technical Changes HLA 1.3 to IEEE P1516 Series

- Creation of a Rationale Annex in P1516
- Addition/modification of Definitions
- Inclusion/modification of descriptive text to insure proper interpretation/consistency among the 3 Specs
- DDM improvements and simplifications
- New I/F service description <-> API mapping clause
- API improvements
- Slight MOM, Time & Ownership Mgt. changes
- Improvements to OMT datatypes
- DIFs now based on XML



The Result: Consensus

We experienced
different reactions
from the balloters...

...but in the end we were
able to work most of the
issues and come to
consensus or
understanding.





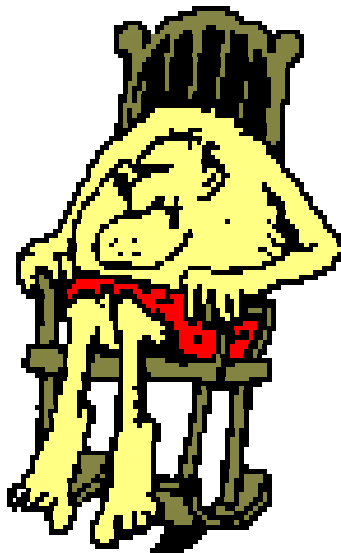
The Future

We're now headed for the recirculation and expect the ballots to pass. So we're racing for the finish line where we fully expect to have one heck of a celebration.

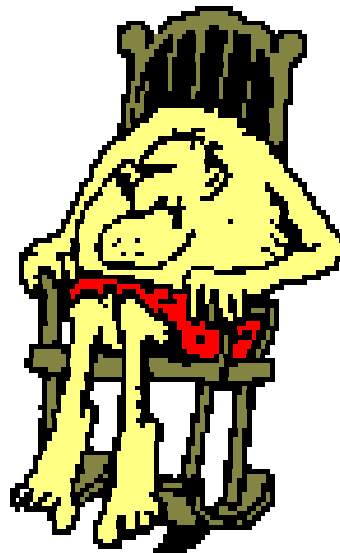




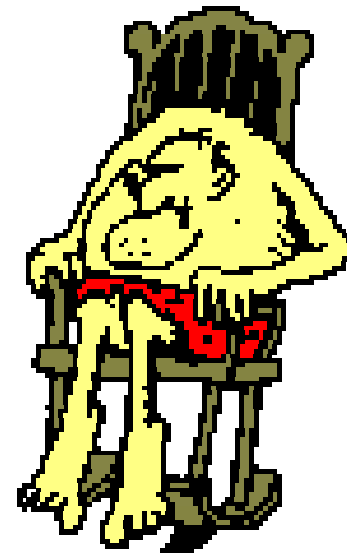
**And When We're Done
Its Off We Go To The...**



BOB



MIKE



REED

Spec Editors' Retirement Home